

Appl. No. 10/657,057
Atty. Docket: 2003B093
Amendment dated March 10, 2006
Reply to Office Action mailed January 13, 2006

REMARKS/ARGUMENTS

Claim Amendments

By the amendments presented Claims 1, 9, 17, 25, 33, 37, 41, 45, 92, 100, 108, 112, 116, 122, 128, 134, 140, and 146 would be rewritten to indicate that the matrix element of the claims is a "clay" matrix instead of a "clay or clay-type" matrix. Support for these amendments again can be found in the original specification in Paragraph [0062] on Page 21.

Also by the amendments presented, Claims 49-91, directed to the non-elected claim group, would be canceled without prejudice.

Upon entry of the claim amendments presented, Claims 1-48 and 92-151 would remain in the application. No additional claim fee would be due as a result of the claim amendments made.

Invention Synopsis

The present invention is directed to the preparation of novel, molecular sieve-based, oxygenate-to-olefins (OTO) conversion catalysts which minimize formation of undesirable, metal-catalyzed, side-reaction by-products that can form during oxygenate conversion. Such catalyst compositions are prepared using clay matrix materials which contain less than specified very low amounts of certain metals including iron, titanium, nickel, cobalt, manganese and vanadium. The presence of catalytic amounts of these metals in oxygenate conversion catalysts, as sometimes introduced into prior art OTO catalysts as impurities in the clay matrix material, has been identified as the cause of the production of efficiency-diminishing by-products in the oxygenate conversion process. Accordingly, elimination or minimization of these metals in oxygenate conversion catalysts improves the overall cost effectiveness of the oxygenate conversion, e.g., methanol-to-olefins, processes in which these low-metal catalysts are used.

Restriction Requirement

The previously applied restriction requirement, after Applicants' traversal, has now been made FINAL. Accordingly, non-elected Claims 49-91 would be canceled from the present application by the amendments presented herein. Such claim cancellation would be done without prejudice to Applicants' right to pursue these canceled non-elected claims via one or more divisional applications.

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Rejection Under 35 USC §112, Second Paragraph

Claims 1-48 and 92-151 have been newly rejected under 35 USC §112, Second Paragraph, as allegedly being indefinite in the use of the term "clay-like" to describe the matrix element of this invention. By the amendments set forth above, the phrase "clay-like" would be removed from the claims. It is submitted, therefore, that entry of the claim amendments presented herein would obviate this rejection under 35 USC §112, Second Paragraph.

Art Rejection

Claims 1-48 and 92-151 have been finally rejected under 35 USC §102(b) as allegedly being anticipated by Martens et al. (U.S. Patent No. 6,440,894, hereinafter "Martens"). The Examiner maintains the position that Martens discloses oxygenate conversion catalysts containing the same molecular sieves and clay matrix materials as those which the Applicants list as being suitable for inclusion in the instantly claimed catalysts. The metal content elements of the rejected claims are said to be inherent in the reference-disclosed materials since some of the names of the disclosed materials used are the same as those set forth in the instant application. Such a rejection over Martens is again respectfully traversed as it would apply to Claims 1-48 and 92-151 as amended herein.

The Martens patent discloses molecular sieve-based oxygenate conversion catalysts which can contain clay matrix materials. Listed clays include "kaolins, commonly known as Dixie, McNamee, Georgia and Florida clays or others in which the main mineral constituent is holysite, kaolinite, dickite, nacrite or anauxite." It is acknowledged that there is no express disclosure in Martens of the metal content of any of the disclosed clays, and it is this silence concerning metal content which brings about this Section 102 rejection on an "inherent anticipation" theory.

As noted in Applicants' previous response, it is well established that anticipation by inherent disclosure is appropriate only when the reference discloses prior art that must necessarily include the unstated limitation. [Cf. Transclean Corp. v. Bridgewood, 62 USPQ 2d 1865 (CAFC, 2002)] This and many other CCPA and CAFC cases have emphasized that the anticipatory inherent feature or result must be consistent, necessary and inevitable, not merely possible or even probable. It is also well established that, in general, the burden is on the

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Examiner to show that the feature urged to be inherent is inevitably found in the elements which are disclosed in the prior art. For example, the PTO Board of Appeals has noted that "In relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." [Cf. Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)].

In the instant situation, the Examiner attempts to reverse this burden of proof by citing In re Fitzgerald et al. (205 USPQ 594) for the proposition that "when the examiner has reason to believe that the functional language asserted to be critical for establishing novelty in claimed subject matter may in fact be an inherent characteristic of the prior art, the burden of proof is shifted to the applicants to prove that the subject matter shown in the prior art does not possess the characteristics relied upon." It is submitted, however, that in the present instance, the Fitzgerald fact situation does not exist and is not analogous to the Fitzgerald situation. Accordingly, the principles of this Fitzgerald case do not shift the burden of showing lack of inherency to the Applicants in this case.

In the first place, the element in question with respect to the present rejection is not "functional language" or a "functional parameter" as was present in the Fitzgerald case. Rather, metal content of clay matrix materials is a purely compositional parameter. Even the very small amounts of metal contamination found in clay matrix materials can be precisely determined, identified and quantified using conventional known analytical techniques such as inductively coupled plasma atomic emission spectroscopy (ICP/AES), atomic adsorption spectroscopy (AAS), and/or x-ray fluorescence (XFF) procedures.

More importantly, the clay matrix materials used in the catalyst compositions to which the amended claims would be directed are not synthetic compositions which are or can be manufactured or synthesized to precise standards and specifications. Rather these clay materials are naturally occurring minerals which are mined from the earth in different places and are formed as a result of varying geological conditions. Rather than an expectation that such materials would consist purely, solely and unvaryingly of the clay structures of interest, the skilled artisan would clearly instead expect that these naturally occurring minerals would vary somewhat in composition and would not be expected to be pure and uncontaminated.

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It is, in fact, well known that natural products such as clays can vary in content of trace elements such as metals. For example, submitted herewith is an excerpt from a World Health Organization publication entitled "Bentonite, Kaolin and Selected Clay Minerals" Environmental Health Criteria 231, 2005. It is noted in the enclosed Paragraph 2.3.5 of this publication that clays can contain a number of trace elements such as those listed. These include some of the metals which, in the present invention, are to be excluded from or minimized within the claimed catalyst compositions which use these types of clay matrix materials. It is also noted in Applicants' original specification in Paragraphs [0063]-[0069] and [0071] that clays with the same generic name such as kaolin can contain varying amounts of metals, and that some kaolins for this reason are not suitable for use as matrix materials in the catalysts claimed herein.

In short, the mere mention in a prior art reference (such as Martens) of clay matrix materials characterized by clay type such as kaolins, or place of origin such as Georgia or Florida, or even specific tradenames such as Dixie or McNamee, does not in and of itself properly lead to the conclusion that such generically disclosed clays will inevitably, always and inherently contain no more than the permitted amounts of metal contaminants specified in Applicants' claims. The mere use in the prior art of some of the same names for such clays and clay types as are used in the Applicants' specification cannot shift to the Applicants burden of proving no inherency. This is because both the Applicants' specification itself and the state of the art suggests that the clay names themselves are not sufficient to completely identify and characterize the low-metal clay materials which must be used in the present invention. There is, in fact, no predicting from the names in and of themselves whether or not the metal contents of such named clay materials would result in catalysts having metal contents that would be above or below the maximum metal concentrations specified in Applicants' amended claims.

Given the foregoing considerations, it is respectfully submitted that the Martens patent does not anticipate the catalyst composition and process-of-making claims herein because this reference neither expressly nor inherently discloses clay matrix materials having Applicants' specified limits on content of the various recited problematic metals. Accordingly, it is further submitted that continued rejection of these amended claims over the Martens reference under 35 USC §102 would be improper.

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CONCLUSIONS

Applicants have made an earnest effort to place their application in proper form, to establish the unity of their invention and to distinguish their claimed invention from the applied prior art. WHEREFORE, reconsideration of this application, entry of the amendments presented, withdrawal of the claim rejection under 35 USC §102, and allowance of the amended claims presented, are all respectfully requested. Alternatively, entry of the amendments presented herein in order to place the claims in better form for appeal is respectfully requested.

It is also respectfully requested that the Examiner expeditiously notify Applicants' undersigned attorney as to the disposition of the amendments and remarks presented herein in accordance with MPEP §714.13.

Any comments or questions concerning the application can be directed to the undersigned at the telephone number given below

Respectfully submitted,

Date: March 10, 2006



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Bentonite, Kaolin and Selected Clay Minerals (EHC 231, 2005)

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This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the United Nations Environment Programme, the International Labour Organization, or the World Health Organization.

Environmental Health Criteria 231

BENTONITE, KAOLIN, AND SELECTED CLAY MINERALS

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Published under the joint sponsorship of the United Nations Environment Programme, the International Labour Organization, and the World Health Organization, and produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals.

World Health Organization Geneva, 2005

The **International Programme on Chemical Safety (IPCS)**, established in 1980, is a joint venture of the United Nations Environment Programme (UNEP), the International Labour Organization (ILO), and the World Health Organization (WHO). The overall objectives of the IPCS are to establish the scientific basis for assessment of the risk to human health and the environment from exposure to chemicals, through international peer review processes, as a prerequisite for the promotion of chemical safety, and to provide technical assistance in strengthening national capacities for the sound management of chemicals.

The **Inter-Organization Programme for the Sound Management of Chemicals (IOMC)** was established in 1995 by UNEP, ILO, the Food and Agriculture Organization of the United Nations, WHO, the United Nations Industrial Development Organization, the United Nations Institute for Training and Research, and the Organisation for Economic Cooperation and Development (Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen cooperation and increase coordination in the field of chemical safety. The purpose of the IOMC is to promote coordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

WHO Library Cataloguing-in-Publication Data

Bentonite, kaolin, and selected clay minerals.

(Environmental health criteria ; 231)

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1.Bentonite - toxicity 2.Kaolin - toxicity 3.Aluminium silicates - toxicity 4.Environmental exposure
5.Risk assessment I.International Programme for Chemical Safety II.Series

ISBN 92 4 157231 0 (LC/NLM classification: QV 65)

ISSN 0250-863X

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This document was technically and linguistically edited by Marla Sheffer, Ottawa, Canada, and printed by Wissenschaftliche Verlagsgesellschaft mbH, Stuttgart, Germany.

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ENVIRONMENTAL HEALTH CRITERIA FOR BENTONITE, KAOLIN, AND SELECTED CLAY MINERALS

PREAMBLE

ACRONYMS AND ABBREVIATIONS

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The kaolinite layers are formed only by a tetrahedral sheet of silica and an octahedral sheet of alumina, which contain almost no isomorphic substitutions (Bailey, 1980a). Hydroxyls of the octahedral sheet bind to oxygens of the tetrahedral sheet of the consecutive layer in the kaolinite crystal. The structural charge of the crystal is nonexistent, and no molecules or cations are present in the interlayer space. The surface area of the kaolinite is thus reduced to external surface area and to edge surface area. The edge surface area is similar in nature and properties to the one observed in montmorillonite and represents approximately 20% of the total surface area. However, two types of external surfaces are defined for kaolinite: one associated with the outermost tetrahedral sheet and the other associated with the outermost octahedral sheet. The reactivity of the external octahedral sheet is due to the hydroxyl groups present, which i) can produce a pH-dependent surface charge by protonation and deprotonation reactions and ii) can react specifically with other molecules (Huertas et al., 1998).

Quartz is the most relevant accessory mineral in bentonite and kaolin. Its structure is a tridimensional framework of silicate tetrahedra arranged sharing corners. In contrast with montmorillonite and kaolinite, quartz surface area is defined only as an external surface. Broken bonds, which compensate charge by adsorption of protons or water molecules, are found in all the crystal phases.

The "active" surface area is close to 100% in quartz, 20% in kaolinite, and 5% in montmorillonite. This may be related to the observed toxicity of these materials (see chapter 6).

2.3.5 Trace elements in clays

Knowledge of mechanisms controlling the distribution of trace elements in clays is scarce and contradictory, in spite of the many investigations carried out on the geochemical behaviour of some trace elements used in geological reconstruction as "geochemical indicators" (Fiore et al., 2003). It is well known that clays contain trace elements that literature indicate as toxic and/or micronutrients (i.e., antimony, arsenic, cadmium, cobalt, copper, lead, mercury, nickel, selenium, tellurium, thallium, zinc) whose concentrations are widely variable, depending on their geological history. These trace elements may be in the clay (or accessory) mineral structure as well as adsorbed on clay particles, which play the most important role in controlling their distribution and abundance. Chemical elements in crystalline positions are usually "locked," whereas those adsorbed may be mobilized and transferred to leaching solutions.

For information on the leaching and bioavailability of clay components, see chapter 5.

2.4 Analytical methods

2.4.1 Quantitative measurement of dust

Inhaled dust appears to be the major mode of human exposure to aluminosilicates, and a general review of methodology for dust sampling and analysis is presented in Degueldre (1983). Quantitative methods for the measurement of total dust and respirable dust are described in the *NIOSH Manual of Analytical Methods* (Eller & Cassinelli, 1994), in Part 40 of the US government's Code of Federal Regulations (US EPA, 1996a), and in *Mine Safety and Health Administration Handbook No. PH90-IV-4* (US Department of Labor, 1990). All of these methods are gravimetric and measure the weight of dust collected on a filter from a known volume of air.

Although the basic principles behind these methods are simple, accurate and precise results demand sensitive equipment and attention to detail. The National Institute for Occupational Safety and Health (NIOSH) method for total dust requires an appropriate sampler with a polyvinyl chloride or equivalent